The Integral Zone of Proximal Development (IZPD): A pedagogical proposal for improving teaching-learning processes

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Abstract

Vygotsky's Zone of Proximal Development (ZPD) has traditionally been understood as the distance between what a learner does alone and what they can do with help. This article proposes expanding it into an Integral Zone of Proximal Development (IZPD) that encompasses four personal dimensions: what the learner knows (knowledge), what they can do (skills and abilities), what they want (motivations, goals, emotions), and what they believe (self-efficacy expectations, attributions). The IZPD is presented as a starting point for any teaching-learning process, as it requires the educator to diagnose the learner's actual situation in each dimension and offer specific, adjusted supports (scaffolding). In contrast to approaches based on universal stages (Piaget, Kohlberg), a neuroscientific and ecological perspective is adopted that recognizes brain plasticity, social learning through imitation (mirror neurons), and empathy as the basis of moral development. Practical examples are offered in general contexts (classroom, vocational training, language learning, social skills) and strategies for dynamic assessment and scaffolding are discussed. The IZPD constitutes a powerful tool for individualizing teaching, fostering autonomy, and improving learning outcomes in any domain.

Keywords: Zone of Proximal Development, teaching-learning, motivation, self-efficacy, scaffolding, personalized pedagogy.

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1. Introduction

In any teaching-learning process—whether in school, vocational training, sports, or social skills learning—educators face a central problem: learners are different from one another. Not only in what they know or can do technically, but also in what they want to achieve and what they believe about their own capabilities. However, traditional teaching tends to homogenize, assuming that all students

of the same age or level should follow the same pace and receive the same instructions.

Vygotsky's (1978) Zone of Proximal Development (ZPD) offers a way to overcome this rigidity. Vygotsky defined the ZPD as the distance between the actual developmental level (what the subject does independently) and the potential developmental level (what they achieve with the help of an adult or more capable peers). Effective teaching must be situated within that zone, offering scaffolding that the learner can progressively internalize.

However, in everyday educational practice, the classical concept of ZPD is often reduced to the cognitive or motor dimension. What the student knows or can do is evaluated, but two equally decisive aspects are neglected: what they want (their motivation, interests, goals) and what they believe (their expectations of success, causal attributions, self-efficacy). A student may know the theory and be able to perform the task, but if they do not want to (lack of interest) or if they believe they will not be capable (low self-efficacy), learning will not occur or will be superficial.

For this reason, this article proposes expanding the ZPD into an Integral Zone of Proximal Development (IZPD) that encompasses four closely related dimensions:

- **Knowledge:** declarative and procedural knowledge.
- **Power:** skills, technical and physical abilities.
- **Will:** motivations, interests, goals, emotional regulation.
- **Belief:** self-efficacy expectations, causal attributions, self-esteem, and personal, sociocultural, and environmental beliefs.

The IZPD thus becomes the starting point for teaching-learning in any field. Before designing any activity, the educator must diagnose where each learner is situated in each dimension and offer personalized supports that allow them to advance towards higher levels.

This article develops the theoretical foundations of the IZPD, describes how to operationalize each dimension in general contexts, offers practical examples, and discusses its application in educator training.

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2. Theoretical Foundations of the Integral Zone of Proximal Development

2.1. From Vygotsky to Integrality

Vygotsky (1978) emphasized that human learning is essentially social and that interaction with others is the engine of development. His concept of ZPD revolutionized pedagogy by focusing on what the student can become, not just on what they already are. However, Vygotsky focused primarily on higher cognitive processes (language, thought). In the general educational field, it is necessary to extend the ZPD to other equally decisive dimensions.

Recent research in neuroscience has confirmed that learning is deeply influenced by motivation and expectations. For example, dopamine release during learning is modulated by expected reward (Schultz, 2015). A student who does not believe they can improve (low self-efficacy) will have less activation of learning circuits, even if adequate cognitive supports are offered (Bandura, 1997). Similarly, a student who does not want to learn because their goal is only to pass without effort or due to fear of failure will show resistances that no instruction can overcome (Ryan & Deci, 2017).

Therefore, the IZPD integrates four domains that act synergistically. The educator must evaluate them and offer specific scaffolding for each dimension (Table 1).

Table 1. Dimensions of the Integral Zone of Proximal Development in General Contexts

Dimension	What are we talking about?	Example in School Learning	Example in Vocational Training
Knowledge	Declarative and procedural knowledge.	The student knows the formula for the area of a circle but does not know when to apply it.	The worker knows the theory of customer service but does not know how to handle a real complaint.
Power	Technical skills, cognitive or motor abilities.	The student can solve simple equations, but not those requiring several steps.	The employee can use the basic software but not the advanced functions.

Dimension	What are we talking about?	Example in School Learning	Example in Vocational Training
Will	Intrinsic/extrinsic motivation, goals, interests, emotions.	The student wants to stand out above classmates, even though the task requires cooperation.	The worker wants to advance quickly and avoids tasks that do not provide visibility.
Belief	Self-efficacy expectations, attributions, perceptions of control.	The student believes that "they have never been good at mathematics."	The worker believes they will not be capable of leading a project because they are "not very creative."

2.2. Neuroscientific and Developmental Bases

The IZPD is not an arbitrary construct. It is supported by current evidence on the brain and human development:

- **Social learning through imitation:** Mirror neurons (Rizzolatti & Sinigaglia, 2006) allow learning by observing others. A student can improve their problem-solving strategy by watching a peer approach a similar exercise. Scaffolding can include live or video modeling.
- **Brain plasticity throughout life:** Eagleman (2020) shows that the brain continuously reconfigures itself. There are no closed critical periods for learning complex skills. An adult can learn a new language or a new professional competence if offered appropriate challenges. The IZPD does not expire with age.
- **Individual variability:** Gopnik (2012) demonstrates that children do not pass through universal stages (surpassing Piaget), but rather construct causally rich hypotheses from a very young age. A 6-year-old child can understand an abstract concept if it is presented in context. The IZPD requires abandoning age-based classifications and attending to singularity.
- **Empathy and prosocial morality:** De Waal (2013) has documented that non-human primates show consolation, reciprocity, and reactions to injustice. This indicates that the basis of cooperation and ethical behavior

is biological and develops through experience, not through rational dilemmas (as Kohlberg assumed). In the IZPD, the will dimension includes the motivation to help others.

2.3. Relationship with Intentionality and Key Questions

In previous works (Mascarell, 2018), it has been argued that human beings are intentional systems oriented towards ends. To understand the IZPD, it is useful to relate each dimension to universal questions:

- **Knowledge** responds to **what** (object of knowledge) and **how** (procedure).
- **Power** responds to **how much** (magnitude of capacity) and **how** (execution).
- **Will** responds to **why** (triggering cause) and **what for** (purpose).
- **Belief** responds to **when** (temporal expectation) and **where** (context of success/failure).

The educator can diagnose the IZPD by asking these questions to the learner and observing their responses and behaviors. For example, asking "why do you think working as a team is important?" reveals the knowledge and will dimensions simultaneously.

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3. Operationalization of the IZPD in Educational Practice

3.1. Initial Assessment of the Four Dimensions

Before designing any intervention, the educator must gather information about each learner. We propose an IZPD profile through:

- **Systematic observation** in authentic tasks (problem-solving, group work, simulation). Register not only technical successes, but also decisions, emotional expressions, and interaction with peers.
- **Brief individualized interview** (5-10 minutes) with questions such as:
    - **Knowledge:** "Can you explain in your own words how to solve this type of problem? In what situations would you apply it?"
    - **Power:** "What do you feel you do well? What do you struggle with? What would you like to practice more?"
    - **Will:** "What do you like most about this subject/job? What would you like to achieve this month?"
    - **Belief:** "Do you believe you can improve at this? Why or why not?"

- **Self-assessment** using a simple rubric (scale 1-5) where the learner scores themselves in each dimension.

With this information, the current zone of each dimension is determined: what the learner already does autonomously and what they need help with to progress.

3.2. Specific Scaffolding for Each Dimension

Below, concrete strategies for each dimension are described, applicable to any educational context.

Scaffolding for the Knowledge Dimension

- Use of examples and counterexamples with guided questions: "Why is this solution correct and this other one not?"
- Advance organizers and collaboratively developed concept maps.
- Signaling during the task with keywords or support cards.
- Structured debates after an activity: "What options did we have? Which one did we choose and why?"

Scaffolding for the Power Dimension

- Modification of task difficulty: reduce the number of steps, increase available time, provide visual aids or tools.
- Gradual practice with increasing complexity levels (level 1 with model, level 2 with supervision, level 3 autonomous).
- Modeling by the educator or a peer (activation of mirror neurons).
- Division of the task into achievable sub-goals.

Scaffolding for the Will Dimension

- Establishment of shared goals (not only individual): "Today the team's goal is for everyone to contribute at least one idea."
- Contingent positive reinforcement for desired behavior (effort, cooperation, persistence), not only for the final result.
- Rotation of roles (coordinator, secretary, presenter) to encourage involvement.
- Emotional regulation: teach breathing techniques, reframing error as opportunity.

Scaffolding for the Belief Dimension

- Design of progressive success tasks: start with situations where the learner has a high probability of success, then gradually increase difficulty.

- Vicarious modeling: show examples of people with similar characteristics (same age, same starting level) who achieved the skill.
- Attribution to effort and strategy: the educator verbalizes "you have improved because you practiced systematically," not "you are intelligent."
- Achievement diary: the learner notes down a small improvement or a moment of overcoming each day.

3.3. Interaction Between Dimensions: The Case of a "Blocked" Student

A real example in a secondary mathematics course: a 14-year-old student has good knowledge of procedures (knowledge) and can perform routine exercises (power), but in exams they freeze and perform far below their capacity. The diagnosis shows that they want to avoid failure (avoidance goal) and believe that if they make a mistake, it will confirm that they are "not good at this."

This student's IZPD lies in the will and belief dimensions. Scaffolding is directed towards:

- **Will:** Change the goal from "not failing" to "learning something new every day." A weekly goal is agreed upon to attempt a difficult problem, even if they do not complete it.
- **Belief:** Offer tasks where error has no negative consequences (ungraded exercises, self-assessment). Modeling is used from a peer who used to be afraid and now faces challenges.

After a month, the student improves their performance without needing more content instruction. The integral IZPD avoided a misdiagnosis (lack of skill) and addressed the real cause.

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4. Examples of Global Tasks for Working on the IZPD in General Contexts

Below, three tasks or activities designed to advance in the four dimensions simultaneously are described, applicable in the classroom, vocational training, or non-formal education.

Task 1: "The Cooperative Puzzle" (for Will and Knowledge dimensions)

- **Description:** A group of 4-5 learners must solve a complex problem (e.g., design a marketing plan, solve a clinical case, write an essay). Each member has a part of the necessary information.
- **Rule:** They cannot advance until all members have shared their information and agreed on a joint solution.

- **IZPD Objective:**
    - **Knowledge:** integrate fragmented knowledge.
    - **Will:** value each person's contribution and prioritize collective success.
- **Scaffolding:** The educator stops the activity and asks "who has not contributed yet? how can we get everyone to participate?"

Task 2: "The Simulation with Advantage" (for Belief and Power dimensions)

- **Description:** A complex task is posed (e.g., an oral presentation, a negotiation, a technical exercise) but the learner is initially provided with an "advantage" (a script, a model, extra time).
- **Rule:** The advantage is progressively withdrawn in successive repetitions.
- **IZPD Objective:**
    - **Belief:** convince the learner that they are capable (self-efficacy).
    - **Power:** practice the skill under conditions of increasing difficulty.
- **Scaffolding:** The educator first chooses easy situations (with help), then reduces help until reaching the real situation.

Task 3: "Reflection Assembly" (for Knowledge and collective Will dimensions)

- **Description:** After a group activity, work is paused and a circle is formed. Participants (without educator intervention) discuss for 3 minutes what worked, what did not, and what they would change.
- **Rule:** They must reach an agreement on a proposal for improvement.
- **IZPD Objective:**
    - **Knowledge:** share tactical and strategic knowledge.
    - **Will:** prioritize the common good over individual preferences.
- **Scaffolding:** The educator observes and then gives feedback on the dialogue process, not on the content of the proposal.

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5. Discussion

The IZPD implies a radical change in the educator's role. From being a mere transmitter of content who corrects executions, they become an integral mediator who observes, questions, offers adjusted supports, and fosters autonomy. This requires training in educational psychology, communication, and qualitative evaluation.

Future research lines include the design of observation tools to reliably assess the IZPD in different contexts, longitudinal studies comparing the effectiveness of this approach with traditional teaching, and adaptations for people with learning difficulties or in intercultural contexts.

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6. Conclusions

1. The Integral Zone of Proximal Development (IZPD) expands the Vygotskian concept by including four dimensions: knowledge, power, will, and belief. All are equally relevant for learning and performance in any educational field.
2. Diagnosis of the IZPD must be carried out before designing teaching, through observation, interview, and self-assessment. Each learner may have different zones in each dimension.
3. Scaffolding must be specific to the dimension that is limiting progress: instruction and organizers for knowledge, task modification for power, reinforcement and goals for will, progressive success and modeling for belief.
4. Global tasks based on authentic situations are the ideal context for working on the IZPD, as they integrate the four dimensions in ecologically valid conditions.
5. The IZPD is a starting point for teaching-learning because it places the learner at the center and holds the educator responsible for adjusting their help to real needs. In contrast to universalist and stage-based approaches, it proposes a flexible pedagogy, based on neuroscientific evidence and respect for each person's singularity.

In short, the IZPD is not only a theory, but a practical guide for daily educational action. Asking oneself "what does each of my students or workers know, can do, want, and believe?" should be the first step before planning any training intervention.

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